

that the thermosetting compositions comprising magnesium hydroxide, PTFE, and crosslinker possess acceptable UL-94 ratings, dielectric constants, dissipation factors, and moisture absorption properties with and without the addition of halogenated flame retardants.

[0053] While preferred embodiments have been shown and described, various modifications and substitutions may be made thereto without departing from the spirit and scope of the invention. Accordingly, it is to be understood that the present invention has been described by way of illustration and not limitation.

What is claimed is:

1. An electrical circuit material comprising a conductive layer disposed a substrate, wherein the substrate is formed from a thermosetting composition comprising:
  - a polybutadiene or polyisoprene resin;
  - a cross-linking agent;
  - a particulate fluoropolymer; and
  - about 20 to about 50 percent by weight, based on the total weight of the thermosetting composition, of a magnesium hydroxide having less than about 1000 ppm of ionic contaminants; wherein the substrate has a UL-94 rating of at least V-1.
2. The electrical circuit material of Claim 1, wherein the thermosetting composition further comprises a butadiene- or isoprene-containing copolymer.
3. The electrical circuit material of Claim 2, wherein the butadiene- or isoprene-containing copolymer is an unsaturated butadiene- or isoprene-containing copolymer.
4. The electrical circuit material of Claim 3, wherein the volume to volume ratio of the polybutadiene or polyisoprene resin to the unsaturated butadiene- or isoprene-containing copolymer is between 1:9 and 9:1, inclusive.
5. The electrical circuit material of Claim 1, wherein the thermosetting composition further comprises a curing agent.
6. The electrical circuit material of Claim 5, wherein the curing agent is an organic peroxide, a dicumyl peroxide, a di(2-tert-butylperoxyisopropyl) benzene, a t-butylperbenzoate, a t-butylperoxy hexyne-3, or a combination comprising one or more of the foregoing curing agents.
7. The electrical circuit material of Claim 1, wherein the thermosetting composition further comprises a low molecular weight polymer.
8. The electrical circuit material of Claim 1, wherein the thermosetting composition further comprises a functionalized liquid polybutadiene or polyisoprene resin.

9. The electrical circuit material of Claim 1, wherein the cross-linking agent is triallylisocyanurate, triallylcyanurate, diallyl phthalate, divinyl benzene, a multifunctional acrylate monomer, or a combination comprising one or more of the foregoing cross-linking agents.

10. The electrical circuit material of Claim 1, wherein the particulate fluoropolymer is a difluoroethylene polymer, a tetrafluoroethylene polymer, a tetrafluoroethylene-hexafluoropropylene copolymer, a copolymer of tetrafluoroethylene with fluorine-free ethylenic monomers, or a combination comprising one or more of the foregoing particulate fluoropolymers.

11. The electrical circuit material of Claim 1, wherein the substrate has a moisture absorption value less than about 0.2% and a UL-94 flammability rating of V-0.

12. The electrical circuit material of Claim 1, wherein the substrate has a dielectric constant less than about 4.5 and a dielectric loss factor less than about 0.01.

13. The electrical circuit material of Claim 16, wherein the conductive layer is copper.

14. The electrical circuit material of Claim 1, wherein the thermosetting composition further comprises a woven or non-woven glass web.

15. The electrical circuit material of Claim 1, wherein the magnesium hydroxide comprises less than about 500 ppm of metal.

16. The electrical circuit material of Claim 1, wherein the thermosetting composition further comprises a chlorine-containing flame retardant, a bromine-containing flame retardant, or a combination comprising one or more of the foregoing flame retardants.

17. The electrical circuit material of Claim 1, wherein the magnesium hydroxide has an average surface area of about 3 to about 12 meters squared per gram.

18. A circuit comprising the electrical circuit material of Claim 1.

19. A substrate for an electrical circuit material, wherein the substrate comprises a thermosetting composition comprising:

a polybutadiene or polyisoprene resin;

a cross-linking agent;

a particulate fluoropolymer; and

about 20 to about 50 percent by weight, based on the total weight of the thermosetting composition, of a magnesium hydroxide having less than about 1000 ppm of ionic contaminants; wherein the substrate has a UL-94 rating of at least V-1.

20. A method of making an electrical circuit substrate material, the method comprising

disposing onto a conductive layer a thermosetting composition comprising

a polybutadiene or polyisoprene resin;

a cross-linking agent;

a particulate fluoropolymer; and

about 20 to about 50 percent by weight, based on the total weight of the thermosetting composition, of a magnesium hydroxide having less than about 1000 ppm of ionic contaminants; and

curing the thermosetting composition.